

## IN THE CLAIMS

1. (currently amended) A method of equalizing output signals from a plurality of signal paths, each signal path having a microphone, the method comprising the steps of:

(a) applying a predictable noise to each signal path to generate an output noise;

~~(a)~~ (b) identifying a transfer function of the each signal path based on the corresponding output noise including a microphone for each of the signal paths;

~~(b)~~ (c) based on a single selected function, determining a filtering function for each signal path such that [[a]] the product of the transfer function and the filtering function is the selected function; and

~~(e)~~ (d) applying the filtering function for each signal path to the corresponding signal path the corresponding transfer function to generate the selected function, thereby correcting the transfer function of the signal path to the selected function, whereby such that the output signals from the signal paths are substantially equal with respect to phase or phase and magnitude.

2. (currently amended) A method according to claim 1, wherein ~~said~~ the selected function is the transfer function for one of ~~said plurality of the~~ signal paths.

3. (currently amended) A method according to claim 1, wherein the selected function is a common factor, and said the filtering function is determined such that [[a]] the product of the transfer function and the filtering function is ~~a selected~~ the common factor.

4. (currently amended) A method according to claim 1, wherein ~~said~~ the step of applying ~~each the~~ filtering function comprises steps of:

(a) providing a filter to ~~the~~ each signal path; and

(b) applying the filtering function for each signal path to the corresponding filter ~~of its corresponding signal path, thereby equalizing output signals from the filter of the signal paths.~~

5. (currently amended) A method according to claim 1, wherein: ~~said step of identifying a transfer function comprises steps of:~~

the step of applying a predictable noise comprises, for each signal path, steps of:

(a) providing a first predictable noise sample signal to the signal path to produce ~~a sample~~ the output noise ~~signal through the signal path;~~ and

(b) providing a second predictable noise sample signal, the second predictable noise sample signal having a property corresponding to the first predictable noise sample signal,

the step of identifying a transfer function comprises, for each signal path, a step of:

~~(b)~~ (c) processing the ~~sample-signal output noise~~ and the second predictable noise sample ~~output~~ signal to identify the transfer function of its corresponding signal path.

6. (canceled)

7. (currently amended) A method according to claim 1, ~~wherein said signal path comprises the microphone for converting a sound signal to an electrical analog signal; and an analog-to-digital converter coupled to the microphone for converting the electrical analog signal into a digital signal, wherein:~~ said step of identifying a transfer function comprises steps of:

the step of applying a predictable noise comprises, for each signal path, steps of:

(a) acoustically providing a first predictable noise sample to the microphone with a propagation time delay to ~~produce~~ generate a first ~~the~~ output noise processed through the signal path; and

(b) providing a ~~second-output~~ noise signal corresponding to the first predictable noise sample with the propagation time delay[;]], ~~and~~

the step of identifying a transfer function comprises, for each signal path, a step of:

(c) processing the first output noise and the ~~second-output~~ noise signal to identify the transfer function of its corresponding signal path.

8. (currently amended) A method according to claim 7, wherein ~~said step of providing the noise sample comprises steps of:~~ the step of providing a first predictable noise sample comprises steps of:

(a) ~~providing~~ generating a first predictable digital noise signal, and

(b) converting the first predictable digital noise signal into ~~said~~ the first predictable noise sample,

the step of providing a noise signal comprises steps of:

(c) generating a second predictable digital noise signal, and

(d) converting the second predictable digital noise signal into the noise signal.

9. (currently amended) A method according to claim 8, wherein ~~said step of providing a second output comprises steps of:~~ the step of converting the second predictable digital noise signal comprises steps of:

(a) ~~providing a second digital noise signal,~~ synchronizing the second predictable digital noise signal ~~being synchronized with said the first predictable digital noise signal and having properties corresponding to said first digital noise signal;~~

(b) delaying the second predictable digital noise signal by same amount of time as ~~said the~~ propagation delay time; and

(c) compensating the second predictable digital noise signal for the conversion factor of ~~said the~~ first predictable digital noise signal ~~into said noise sample.~~

10. (currently amended) A method according to claim 6, wherein for each signal path, said the transfer function of the signal path is a transfer function of ~~said the~~ microphone.

11. (currently amended) A method according to claim 7, wherein ~~said the~~ propagation delay time (~~T~~) is selected to be integer multiple of ~~said the first predictable~~ noise sample.

12. (currently amended) A method according to claim 8, wherein the step of generating a first predictable digital noise signal includes a step of utilizing ~~said first digital noise signal is provided by~~ a maximum length sequence generator to generate the first predictable digital noise signal.

13. (currently amended) A method according to claim ~~[[9]]~~ 8, wherein the step of generating a second predictable digital noise signal includes a step of utilizing ~~said second digital noise signal is provided by~~ a maximum length sequence generator to generate the second predictable digital noise signal.

14. (currently amended) A method according to claim ~~[[9]]~~ 8, wherein each of said the first predictable digital noise signal and the second predictable digital noise signal comprises a white noise signal.

15. (currently amended) A method according to claim ~~[[9]]~~ 8, wherein each of said the first predictable digital noise signal and the second predictable digital noise signal comprises a random noise signal.

16. (currently amended) An apparatus for equalizing output signals from a plurality of signal paths, each signal path having a microphone, the apparatus comprising:

(a) a module for applying a predictable noise to each signal path to generate an

output noise;

(a) means (b) a module for identifying a transfer function of ~~the each~~ signal path ~~including a microphone based on the corresponding output noise for each of the signal paths;~~

~~(b) means (c) a module~~ for determining, based on a single selected function, a filtering function for each signal path such that ~~[[a]] the~~ product of the transfer function and the filtering function is the selected function; and

~~(e) means (d) a module~~ for applying the filtering function for each signal path to the corresponding signal-path transfer function, thereby correcting the transfer function of the signal path to the selected function to generate the selected function, whereby such that the output signals from the signal paths are substantially equal with respect to phase or magnitude and phase.

17. (currently amended) An apparatus according to claim 16, wherein ~~said the~~ selected function is the transfer function for one of the signal paths.

18. (currently amended) An apparatus according to claim 16, wherein the selected function is a common factor, and said the filtering function is determined such that ~~[[a]] the~~ product of the transfer function and the filtering function is ~~a selected the~~ common factor.

19. (currently amended) An apparatus according to claim 16, wherein ~~said filtering function applying means~~ the module for applying the filtering function comprises:

(a) a filter provided to ~~the each~~ signal path; and

(b) means a module for applying loading the filtering function for each signal path to the corresponding filter ~~of its corresponding signal path, thereby equalizing output signals from the filter of the signal paths.~~

20. (currently amended) An apparatus according to claim 16, wherein: ~~said transfer function identifying means comprises:~~

the module for applying a predictable noise comprises, for each signal path:

(a) means a noise generator for providing a first predictable noise sample signal to the signal path to produce ~~[[a]] the sample output noise signal through the signal path[;]]~~ and providing a second predictable noise sample signal, the second predictable noise sample signal having a property corresponding to the first predictable noise sample signal,

**the identifying module comprises, for each signal path:**

- (b) **means a module** for processing the **sample signal output noise** and the **second predictable noise** sample ~~output~~ signal to identify the transfer function of its corresponding signal path.

21. (currently amended) An apparatus according to claim ~~[[16]]~~ **20**, wherein ~~said signal path comprises~~ the microphone **is capable of** ~~[[for]]~~ converting a sound signal to an electrical analog signal~~[[;]]~~, and **each signal path further includes** an analog-to-digital converter coupled to the microphone for converting the electrical analog signal into a digital signal, ~~wherein said transfer function identifying means comprises:~~

~~(a) means for providing a noise sample to the microphone to produce a sample output signal through the signal path; and~~

~~(b) means for processing the noise sample and the sample output signal to identify the transfer function of its corresponding signal path.~~

22. (currently amended) An apparatus according to claim 16, wherein ~~said signal path comprises~~ the microphone **is capable of** ~~[[for]]~~ converting a sound signal to an electrical analog signal~~[[;]]~~, and **each signal path further includes** an analog-to-digital converter coupled to the microphone for converting the electrical analog signal into a digital signal, wherein: ~~said transfer function identifying means comprises:~~

**the module for applying a predictable noise comprises, for each signal path:**

- (a) **means a module** for acoustically providing a **first predictable** noise sample to the microphone with a propagation time delay to produce ~~a first the~~ output **noise processed through the signal path; and**

- (b) **means a module** for providing a **second output noise signal** corresponding to the **first predictable** noise sample with the propagation time delay~~[[;]]~~, ~~and~~

**the module for identifying a filtering function comprises, for each signal path:**

- (c) **means a module** for processing the **first** output **noise** and the ~~second output noise signal~~ to identify the transfer function of its corresponding signal path.

23. (currently amended) An apparatus according to claim 22, wherein ~~said noise sample providing means~~ **the module for providing a first predictable noise sample** comprises:

- (a) a first noise generator for generating a first **predictable digital** noise signal; and
- (b) **means a first converter** for converting the first **predictable** digital noise signal into

~~said the first predictable~~ noise sample,

the module for providing a noise signal comprises:

(c) a module for providing a second predictable digital noise signal; and

(d) a second converter for converting the second predictable digital noise signal into the noise signal.

24. (currently amended) An apparatus according to claim 23, wherein ~~said a second output providing means~~ the second converter comprises:

(a) ~~a second noise generator for generating a second digital noise signal, a synthesizer for synthesizing~~ the second predictable digital noise signal ~~being synchronized with said the first predictable digital noise signal and having properties corresponding to said first digital noise signal;~~

(b) ~~means~~ a module for delaying the second predictable digital noise signal by same amount of time as ~~said the~~ propagation delay time; and

(c) ~~means~~ a module for compensating the second predictable digital noise signal for the conversion factor of ~~said the first predictable digital noise signal into said noise sample.~~

25. (currently amended) An apparatus according to claim 23, wherein ~~said first digital noise signal providing means~~ the first noise generator ~~[[is]]~~ includes a maximum length sequence generator.

26. (currently amended) An apparatus according to claim 23, wherein ~~said converting means~~ the first converter includes:

a digital-to-analog converter for converting the first predictable digital noise signal into an analog noise signal, and

a loud speaker for providing the analog noise signal to the microphone.

27. (currently amended) An apparatus according to claim ~~[[24]]~~ 23, wherein ~~said second digital noise providing means includes~~ the second predictable digital noise signal is generated by a maximum length sequence generator.

28. (currently amended) An apparatus according to claim 21, wherein for each signal path, ~~said the~~ transfer function of the signal path is a transfer function of ~~said the~~ microphone.

29. (currently amended) An apparatus according to claim 22, wherein ~~said the~~ propagation delay time is selected to be integer multiple of ~~said the~~ first predictable noise sample.

30. (currently amended) An apparatus according to claim ~~[[24]]~~ 23, wherein ~~said each of the~~

first predictable noise signal and the second predictable digital noise signal[[s]] ~~are comprises~~ a white noise signal.

31. (currently amended) An apparatus according to claim [[24]] 23, wherein ~~said~~ each of the first predictable noise signal and the second predictable digital noise signal[[s]] ~~are comprises~~ a random noise signal.

32. (currently amended) An apparatus according to claim [[24]] 23, wherein ~~said~~ the first predictable digital noise signal and the second predictable digital noise signal are ~~provided~~ generated by a single source the first noise generator.

33. (currently amended) A listening device comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized using [[a]] the method according to claim 1.

34. (currently amended) A hearing aid comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized using [[a]] the method according to claim 1.

35. (currently amended) A headset comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized using [[a]] the method according to claim 1.

36. (currently amended) A listening device comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized by an the apparatus according to claim 16.

37. (currently amended) A hearing aid comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized by an the apparatus according to claim 16.

38. (currently amended) A headset comprising:

a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, outputs from the signal paths being equalized by an the apparatus

according to claim 16.

39. (currently amended) A listening device comprising:

**a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, and**

a signal equalization filter **provided for each signal path**, wherein the function of the **signal equalization** filter is determined by ~~an~~ **the** method according to claim 1 **and is loaded to the signal equalization filter.**

40. (currently amended) A hearing aid comprising:

**a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, and**

a signal equalization filter **provided for each signal path**, wherein the function of the **signal equalization** filter is determined by ~~an~~ **the** method according to claim 1 **and is loaded to the signal equalization filter.**

41. (currently amended) A headset comprising:

**a plurality of signal paths for transmitting sound signals to a user, each signal path having a microphone, and**

a signal equalization filter **provided for each signal path**, wherein the function of the **signal equalization** filter is determined by ~~an~~ **the** method according to claim 1 **and is loaded to the signal equalization filter.**

42. (currently amended) A method of ~~correcting transfer functions of~~ **providing sound signals to a user through a system including** a plurality of signal paths, **each signal path having a microphone,** the method comprising steps of:

**preparing a filtering function for each signal path, including the steps of:**

**(a) applying a predictable noise to each signal path to generate an output noise;**

~~(a)~~ **(b) identifying a transfer function of the each signal path including a microphone based on the corresponding output noise for each of the signal paths; and**

~~(b)~~ **(c) determining, based on a single selected function, [[a]] the filtering function for each signal path such that [[a]] the product of the transfer function and the filtering function is the selected function[[;]], and**



operating the system, including the steps of:

(e) (d) applying the filtering function for each signal path to the corresponding signal-path transfer function to generate the selected function, and

(e) providing the sound signals to the signal paths, whereby the ~~outputs of~~ sound signals output from the signal paths are substantially equal with respect to phase or phase and magnitude.

43. (currently amended) ~~An apparatus for equalizing output signals from a plurality of signal paths, the apparatus~~ A sound system comprising:

a system for providing sound signals to a user, including:

(a) a plurality of signal paths for transmitting the sound signals to the user, each signal path including a microphone; and

(b) a filter provided to each signal path,

an equalizing module, including:

(c) a circuit for applying a predictable noise to each signal path to generate an output noise;

~~(a)~~ (d) an identification circuit for identifying a transfer function of ~~the~~ each signal path ~~including a microphone~~ based on the corresponding output noise for each of the signal paths; and

~~(b)~~ (e) a determination circuit for determining, based on a single selected function, a filtering function for each signal path such that ~~[[a]]~~ the product of the transfer function and the filtering function is the selected function~~[[;]], and~~

~~(e) a filter for applying when the signal paths transfer the sound signals to the user,~~ the filtering function being applied to the corresponding ~~signal-path filter to generate the selected function thereby correcting the transfer function of the signal path to the selected function~~, whereby the ~~output sound~~ sound signals from ~~the signal paths~~ the sound providing system are substantially equal with respect to phase or phase and magnitude.

44. (new) A sound system according to claim 43, wherein the selected function is the transfer function for one of the signal paths.

45. (new) A sound system according to claim 43, wherein the selected function is a common factor, and the filtering function is determined such that the product of the transfer function and the filtering function is the common factor.

46. (new) A sound system according to claim 43, wherein:

the circuit for applying a predictable noise signal comprises, for each signal path:

(a) a module for providing a first predictable noise signal to the microphone to produce the output noise; and

(b) a module for providing a second predictable noise signal, the second predictable noise signal having a property corresponding to the first predictable noise signal,

the identifying circuit comprises, for each signal path:

(c) a module for processing the output signal and the second predictable noise signal.

47. (new) A sound system according to claim 46, wherein the module for providing a first predictable noise signal includes a maximum length sequence generator for generating the first predictable noise signal.

48. (new) A sound system according to claim 47, wherein the maximum length sequence generator generates the second predictable noise signal.

49. (new) An apparatus according to claim 16, wherein the module for identifying a transfer function performs an Auto Regressive Moving Average (ARMA) to estimate the transfer function.

50. (new) A sound system according to claim 43, wherein the identifying circuit performs an Auto Regressive Moving Average (ARMA) to estimate the transfer function.